Fuel Price Increases and Impact on Driver Behavior

Accounting for behavioral responses and modeling the impact of significant fuel price increases has prompted a discussion of fuel price increases and the impact on driver behavior. This summarizes discussions during the month of April, 2007.

Introduction

Discussion of fuel prices and their corresponding influences on travel behavior have occurred intermittently, along with the issue of how to account for price increases within the travel demand modeling process and how to account for fuel price elasticity. With recent nationwide gasoline price increases, the discussion of fuel prices and modeling approaches was once again initiated with a newspaper article regarding observed responses to recent fuel price increases. The article and several replies provided context for the discussion by highlighting previous behavioral responses to fuel price increases in the late 1970's compared to current driving habits. Further context was provided by discussion on the impact of significant gas price increases resulting from higher taxes. Based on information provided by the article as well as other contributions, there has been observed precedent associated with fuel price changes as well as driver responses to these changes. For example, fuel price increases in the late 1970's led to the following behavior shifts:

- Reduced driving, reduced fuel consumption (20 percent gas price increase yielded six percent less consumption);
- Purchasing more fuel efficient vehicles;
- Changing mode of travel; and,
- Changing residential location.

Whereas recent (2001 to 2006) fuel price increases and resulting driver behavior have not been consistent with behavior observed during the 1975 to 1980 timeframe:

- Recent data indicates drivers are not taking steps observed during the 1970's to conserve fuel (20 percent gas price increase yielded one percent less consumption),
- Minimal change in average vehicle fuel efficiency during the past five years; increased purchases of fuel efficient vehicles comparable to the 1970's have not occurred.

A presumption offered on the listserv indicated that market forces may increase gas prices to $4.00 per gallon or higher in the near future. It was also noted that higher gas prices could arise from increased federal or state taxes. Proponents that advocate higher gas taxes think this policy change would:

- Discourage consumption;
- Stimulate increased demand for fuel efficient vehicles;
- Provide funding for alternative energy sources; and
- Provide funding for additional public transportation.

Conversely, some economists argue that higher prices would not lead Americans to alter their travel behavior or influence consumption because people would make other household budget sacrifices before modifying current driving patterns or purchasing fuel efficient vehicles. One respondent noted that the nominal price of gasoline increased from $0.50 per gallon to $2.00 per gallon between the late 1970's and the late 1990's; yet, in real terms the price declined which resulted in further fuel consumption. Hence, a recommendation was made to verify that a fuel price increase exceeds regional wage increases or the Consumer Price Index (CPI) prior to drawing any conclusions regarding behavioral shifts in response to perceived fuel price

increases. It was further noted that perceptions of whether price increases are temporary or long-term can also potentially influence behavioral responses.

Key Discussion Issues

Apart from the comments noted above, responses to the discussion on fuel price increases and their impact on driver behavior were varied. Three separate threads of discussion however accounted for the majority of comments. Though seemingly independent, the three topics listed below each offer relevant perspective on model development and application:

- Potential demand responses to fuel price increases;
- Viability of modeling long-term impacts; and,
- Modeling approaches.

Following is a brief synopsis of the comments provided within the three separate threads of discussion.

Potential Responses to Fuel Price Increases

Various behavioral responses to fuel price increases were provided throughout the discussion; however, when the discussion focused on significant fuel price increases, it was anticipated that potential responses could include changes in:

- Land use patterns;
- Trip/activity generation rates;
- Distribution of trip/activity locations;
- Mode of travel; and,
- Vehicle fuel efficiency.

Furthermore, significantly higher gas prices may decrease population and employment growth in auto dependent regions while encouraging additional growth in less auto-dependent regions. Similarly, sizeable increases in heating fuel costs could promote growth in milder climate regions.

Viability of Modeling Long-Term Impacts

An observation was made that potential means of modeling the impact of significant fuel price increases have not been forthcoming because:

- It has not yet occurred and consequently observed behavioral responses are not available;
- Predicting market constraints and technical innovations that will impact the cost of driving over a 30 year time frame is speculative.

A question arose as to whether existing modeling techniques can adequately address long-term changes in transportation costs. It was stated for example that model coefficients derived during model estimation are only valid for the range of variable values present in the estimation data set; consequently, there are limits to extrapolating elasticity curves for future conditions considerably different than existed during model estimation.

Modeling Approaches

One of the latter emails in the discussion concluded that potential modeling approaches to address fuel price change responses might include the following:

- Development of an integrated microsimulation-based land use/transportation model;
- Application of empirically based regional sketch-level models;
- Development of reasonably robust models and reliance on professional judgment; and,
- Defining a probable future by employing a multi-scenario analysis using the previous three approaches.

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